

Description

Visual system of a bonding device, method for determining position and posture of a workpiece to be bonded and storage medium

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Technical Field

The disclosure relates to the field of semiconductor device processing, in particular to a visual system of a bonding device, a method for determining position and posture of a workpiece to be bonded, and a computer-readable storage medium.

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Background

In the manufacturing process of bonding a chip and a wafer, the bonded chip often have a plurality of sizes. However, in a traditional high precision visual system, the size of the view field of the imaging module is generally only a few millimeters.

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In the case where the size variation of the chips that need to be collected is tens of millimeters, the traditional visual system cannot fully cover all chip sizes, which affects the collection of the position and/or posture of the chips, thereby affecting the bonding efficiency between the wafer and the chip.

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In order to overcome the above-mentioned shortcomings of existing technologies, there is an urgent need in the art for an improved visual system of a bonding device, which can be used to collect an image of a plurality of markers on workpieces to be bonded with various sizes, to improve the bonding efficiency of wafer bonding process.

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Summary

A brief overview of one or more aspects is provided below to provide a basic understanding of these aspects. The summary is not an extensive overview of all of the aspects that are contemplated, and is not intended to identify key or decisive elements in all aspects. The sole purpose of the summary is to present some concepts of one or more aspects in a simplified form as a prelude to the more detailed

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description that is presented later.

In order to overcome the above-mentioned shortcomings of existing technologies, the present invention provides a visual system of a bonding device, a method for determining position and posture of a workpiece to be bonded, and a computer-readable storage medium, which can be used to collect an image of a plurality of markers on a workpiece to be bonded, to improve the bonding efficiency of wafer bonding process by adjusting angles of a view field of a plurality of imaging modules.

Specifically, the visual system of a bonding device according to the first aspect of the present invention comprises a plurality of imaging modules and a view field adjustment mechanism. The plurality of imaging modules are used to capture an image of a plurality of markers on a workpiece to be bonded, so as to characterize a position and/or an orientation of the workpiece to be bonded. The view field adjustment mechanism is used to rotate at least one of the imaging modules, adjusting a view field position thereof, to cover the plurality of markers on the workpiece to be bonded.

Furthermore, in some embodiments of the disclosure, the visual system further comprises a controller, which is configured for: obtaining spacing information between the plurality of markers, to determine whether a view field of one of the imaging modules can simultaneously cover the plurality of markers; in response to a judgment result that the view field of the one of the imaging modules can simultaneously cover the plurality of markers, rotating the one of the imaging modules through the view field adjustment mechanism to capture the image of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded; and in response to a judgment result that the view field of the one of the imaging modules cannot simultaneously cover the plurality of markers, rotating the plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded.

Furthermore, in some embodiments of the disclosure, the rotating the one of the imaging modules through the view field adjustment mechanism to capture image of

the plurality of markers comprises: obtaining coarse position information of the plurality of markers and first position and posture information of a first imaging module, to determine a first rotation angle and a first rotation path range of the first imaging module; obtaining current second position and posture information of a second imaging module, and combining it with the first rotation path range, to determine whether the second imaging module affects rotation of the first imaging module; and in response to a judgment result that the second imaging module affects the rotation of the first imaging module, determining a second rotation angle of the second imaging module according to the current second position and posture information and the first rotation path range, and rotating the second imaging module through the view field adjustment mechanism to avoid affecting the rotation of the first imaging module.

Furthermore, in some embodiments of the disclosure, the rotating the one of the imaging modules through the view field adjustment mechanism to capture images of the plurality of the markers further comprises: in response to a judgment result that the second imaging module does not affect the rotation of the first imaging module, rotating the first imaging module through the view field adjustment mechanism according to the first rotation angle, to capture the image of the plurality of markers.

Furthermore, in some embodiments of the disclosure, the controller is further configured for: determining fine position information of the plurality of markers, according to the position of the plurality of markers in the image, and the first rotation angle of the first imaging module; and determining the position and/or the orientation of the workpiece to be bonded, according to the fine position information of the plurality of markers.

Furthermore, in some embodiments of the disclosure, the workpiece to be bonded is a chip, with two of the markers set on two feature positions on edges thereof. The visual system comprises two imaging modules. The rotating the plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers comprises: separately obtaining coarse position information of each of the markers, and position and posture information of each of the imaging modules; determining a first rotation angle of a

first imaging module, and rotating the first imaging module through the view field adjustment mechanism to capture a first image of a first marker, according to first coarse position information of the first marker and first position and posture information of the first imaging module; and determining a second rotation angle of a second imaging module, and rotating the second imaging module through the view field adjustment mechanism to capture a second image of a second marker, according to second coarse position information of the second marker and second position and posture information of the second imaging module.

Furthermore, in some embodiments of the disclosure, the controller is further configured for: determining first fine position information of the first marker, according to a first position of the first marker in the first image, and a first rotation angle of the first imaging module; determining second fine position information of the second marker, according to a second position of the second marker in the second image, and a second rotation angle of the second imaging module; and determining the position and/or the orientation of the workpiece to be bonded according to the first fine position information and the second fine position information.

Furthermore, in some embodiments of the disclosure, the view field adjustment mechanism comprises a drive module, a transmission module, a limit module and a stop module. The drive module is used to provide a rotational driving force. The transmission module is used to transmit the rotational driving force to a corresponding imaging module, to make it perform rotational motion. The limit module is used to restrict a rotation range of the imaging module, to prevent it from colliding with another component. The stop module is used to lock a rotation shaft of the imaging module after it rotate to a target angle.

Furthermore, in some embodiments of the disclosure, the imaging module comprises a prism, a cylindrical mirror and a camera. The prism is located at one end of the imaging module near the workpiece to be bonded, and used to rotate a view field of the imaging module. The cylindrical mirror is located between the prism and a camera, and used to project an image of the workpiece to be bonded onto an imaging surface of the camera. The camera is located at one end of the imaging module away from the workpiece to be bonded, and used to capture the image of the plurality of

markers on the workpiece to be bonded, through the cylindrical mirror and the prism.

Furthermore, in some embodiments of the disclosure, the workpiece to be bonded is a chip. The length range of its long side is between 0.1mm and 50mm, wherein a view field of the imaging module is circular, with a diameter ranging from 1mm to 10mm. Alternatively, a view field of the imaging module is rectangular, with a long side length ranging from 1mm to 10 mm.

In addition, the above-mentioned method for determining position and posture of a workpiece to be bonded according to the second aspect of the present invention comprises following steps: obtaining spacing information between a plurality of markers on a workpiece to be bonded, to determine whether a view field of one imaging module of the visual system according to claim 1 can simultaneously cover the plurality of markers; in response to a judgment result that the view field of the imaging module can simultaneously cover the plurality of markers, rotating the imaging module through a view field adjustment mechanism to capture an image of the plurality of markers, to characterize a position and/or an orientation of the workpiece to be bonded; and in response to a judgment result that the view field of the imaging module cannot simultaneously cover the plurality of markers, rotating a plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded.

In addition, the above-mentioned non-transitory computer-readable storage medium according to the third aspect of the present invention stores a computer instruction thereon. The method for determining position and posture of a workpiece to be bonded provided in the second aspect of the present invention is implemented when the computer instruction is executed by a processor.

Brief Description of the Drawings

The above features and advantages of the present invention will be better understood after reading the detailed description of the embodiments of the present disclosure in conjunction with the following figures. In the figures, components are not necessarily drawn to scale, and components having similar related features may

have the same or similar reference numerals.

Fig. 1 shows a schematic diagram of a visual system of a bonding device provided according to some embodiments of the present invention.

Fig. 2 shows a schematic diagram of a visual system of a bonding device
5 provided according to some embodiments of the present invention.

Fig. 3 shows a flowchart of a method for determining position and posture of a workpiece to be bonded provided according to some embodiments of the present invention.

Fig. 4 shows a position schematic diagram of a view field of an imaging module
10 and a workpiece to be bonded provided according to some embodiments of the present invention.

Fig. 5 shows a position schematic diagram of a view field of an imaging module and a workpiece to be bonded provided according to some embodiments of the present invention.

Fig. 6 shows a position schematic diagram of a view field of an imaging module
15 and a workpiece to be bonded provided according to some embodiments of the present invention.

Detailed Description of Embodiments

The embodiments of the present invention are described in the following
20 detailed description. Other advantages and effects of the present invention will be readily apparent to those skilled in the art from this disclosure. Although the description of the present invention will be described in conjunction with the preferred embodiments, this is not a limitation of the present invention. On the
25 contrary, the invention is described in connection with the embodiments so as to cover other alternatives or modifications that are possible in the embodiments of the present invention. In order to provide a thorough understanding of the present invention, many specific details are included in the following description. The present invention may also be practiced without these details. In addition, some specific details are
30 omitted in the description in order to avoid confusing or obscuring the present invention.

In the description of the present invention, it should be noted that the terms "installation", "connecting", and "connected" should be understood broadly unless explicitly stated and defined otherwise. For example, the terms "installation", "connecting", and "connected" may be either a fixed connection, a detachable
5 connection, or an integral connection; the terms may be either a mechanical connection or an electrical connection; the terms also may be either a direct connection, an indirect connection through an intermediate medium, or an internal connection between two components. The specific meaning of the above terms in the present invention can be understood in a specific case by those skilled in the art.

10 In addition, "up", "down", "left", "right", "top", "bottom", "horizontal", "vertical" used in the following description shall be understood as the orientation described in the paragraph and shown in the related figure. The relative term is used for convenience of description only, and does not mean that the device described therein is to be manufactured or operated in the specific orientation, and therefore
15 should not be construed as limiting the present invention.

Understandably, although the terms "first", "second", "third", etc. may be used to describe various components, regions, layers and/or portions to distinguish different components, regions, layers and/or portions, the order of these components, regions, layers and/or portions described above should not be limited by the terms.
20 Therefore, a first component, region, layer and/or portion mentioned below may be also mentioned as a second component, region, layer and/or portion without departing from some embodiments of the present invention.

As mentioned above, in a traditional high precision visual system, the size of the view field of the imaging module is generally only a few millimeters. In the case
25 where the size variation of the chips that need to be collected is tens of millimeters, the traditional visual system cannot fully cover all chip sizes, which affects the collection of the position and/or posture of the chips, thereby affecting the bonding efficiency between the wafer and the chip.

In order to overcome the above-mentioned shortcomings of existing
30 technologies, the present invention provides a visual system of a bonding device, a method for determining position and posture of a workpiece to be bonded, and a

computer-readable storage medium, which can be used to collect an image of a plurality of markers on a workpiece to be bonded, to improve the bonding efficiency of wafer bonding process by adjusting angles of a view field of a plurality of imaging modules.

5 Please refer to Fig. 1 and Fig. 2. Fig. 1 shows a schematic diagram of a visual system of a bonding device provided according to some embodiments of the present invention. Fig. 2 shows a schematic diagram of a visual system of a bonding device provided according to some embodiments of the present invention.

10 In the embodiment shown in Fig. 1, the above-mentioned visual system of a bonding device provided in the first aspect of the present invention comprises a plurality of imaging modules and a view field adjustment mechanism. Herein, the plurality of imaging modules are used to capture an image of a plurality of markers on a workpiece to be bonded, so as to characterize a position (x, y) in the world coordinate system and/or a rotation angle θ relative to a preset direction in the horizontal plane of the workpiece to be bonded. The view field adjustment mechanism is used to rotate at least one of the imaging modules, adjusting a view field position thereof, to cover the plurality of markers on the workpiece to be bonded.

15 In addition, in the embodiment shown in Fig. 1, the above-mentioned view field adjustment mechanism comprises a drive module 11, a transmission module 12, a limit module 13 and a stop module 14. Herein, the drive module 11 is used to provide a rotational driving force. The transmission module 12 is used to transmit the rotational driving force to a corresponding imaging module, to make it perform rotational motion. The limit module 13 is used to restrict a rotation range of the imaging module, to prevent it from colliding with another component. The stop module 14 is used to lock a rotation shaft of the imaging module after it rotate to a target angle, to prevent additional errors caused by shaking.

20 Furthermore, in the embodiment shown in Fig. 1, the above-mentioned limit module 13 can limit the rotation range of the imaging module through photoelectric signals. Alternatively, in the embodiment shown in Fig. 2, the above-mentioned limit module 13 can limit the rotation range of the imaging module through a mechanical

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structure.

In addition, in the embodiment shown in Fig. 1, the above-mentioned imaging module comprises a prism 21, a cylindrical mirror 22 and a camera 23. Herein, the prism 21 is located at one end of the imaging module near the workpiece to be bonded, and used to rotate a view field of the imaging module. Specifically, the prism 21 can change the optical path inside the imaging module, so that the view field of the imaging module rotates synchronously around the rotation center during the rotation of the imaging module. The cylindrical mirror 22 is located between the prism 21 and the camera 23, and used to project a image of the workpiece to be bonded onto an imaging surface of the camera. The camera is located at one end of the imaging module away from the workpiece to be bonded, and used to capture the image of the plurality of markers on the workpiece to be bonded, through the cylindrical mirror 22 and the prism 21.

Furthermore, in some embodiments, the above-mentioned workpiece to be bonded is a chip, the length range of its long side is between 0.1mm and 50mm. A view field of the above-mentioned imaging module is circular, with a diameter ranging from 1mm to 10mm. Alternatively, in some embodiments, a view field of the above-mentioned imaging module is rectangular, with a long side length ranging from 1mm to 10 mm.

In some non-limiting embodiments, the above-mentioned visual system of a bonding device provided in the first aspect of the present invention comprises a memory and a processor. The memory includes, but is not limited to, the computer-readable storage medium provided in the third aspect of the present invention, on which computer instructions are stored. The processor is connected to the memory and configured to execute the computer instructions stored on the memory to implement the method for determining position and posture of a workpiece to be bonded provided in the first aspect of the present invention.

The working principle of the above-mentioned visual system of a bonding device will be described below in conjunction with some embodiments of methods for determining position and posture of a workpiece to be bonded. Those skilled in the art can understand that the embodiments of these methods for determining

position and posture of a workpiece to be bonded only provide some non-limiting implementations of the present invention, which is intended to clearly display the main idea of the present invention, and provide some specific proposals that are convenient for the public to implement, rather than limiting all working modes or all functions of the visual system of a bonding device. Similarly, the visual system of a bonding device is only a non-limiting embodiment provided by the present invention, and does not limit the implementation subject to each step in these methods for determining position and posture of a workpiece to be bonded.

Please refer to Fig. 3 to Fig. 6 for details. Fig. 3 shows a flowchart of a method for determining position and posture of a workpiece to be bonded provided according to some embodiments of the present invention. Fig. 4 shows a position schematic diagram of a view field of an imaging module and a workpiece to be bonded provided according to some embodiments of the present invention. Fig. 5 shows a position schematic diagram of a view field of an imaging module and a workpiece to be bonded provided according to some embodiments of the present invention. Fig. 6 shows a position schematic diagram of a view field of an imaging module and a workpiece to be bonded provided according to some embodiments of the present invention.

As shown in Fig. 3, the controller can firstly obtain spacing information between the plurality of markers, to determine whether a view field of one of the imaging modules can simultaneously cover the plurality of markers.

Afterwards, as shown in Fig. 4, in response to a judgment result that the view field of the one of the imaging modules can simultaneously cover the plurality of markers, the controller can rotate the one of the imaging modules through the view field adjustment mechanism to capture the image of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded 30.

In this way, the above-mentioned visual system of a bonding device provided in the first aspect of the present invention can capture the position and/or posture of small size workpieces to be bonded by using only the view field of one of the imaging module, to overcome the problem of blind spots in the view field of the plurality of the imaging module that cannot cover the markers of the small chip, and to reduce

the secondary calculation requirements and errors of coordinate system conversion, thereby improving the alignment efficiency and accuracy of the workpiece to be bonded.

Alternatively, in response to a judgment result that the view field of the one of the imaging modules cannot simultaneously cover the plurality of markers, the controller can rotate the plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded 30.

Specifically, the controller can firstly obtain coarse position information of the plurality of markers in the world coordinate system (e.g. approximate positions with millimeter level accuracy), and first position and posture information of a first imaging module, to determine a first rotation angle and a first rotation path range of the first imaging module

Afterwards, the controller can obtain current second position and posture information of a second imaging module, and combine it with the first rotation path range, to determine whether the second imaging module affects rotation of the first imaging module.

Afterwards, in response to a judgment result that the second imaging module affects the rotation of the first imaging module, the controller can determine a second rotation angle of the second imaging module according to the current second position and posture information and the first rotation path range, and rotate the second imaging module through the view field adjustment mechanism, to avoid affecting the rotation of the first imaging module.

Alternatively, in other embodiments, in response to a judgment result that the second imaging module does not affect the rotation of the first imaging module, the controller can rotate the first imaging module through the view field adjustment mechanism according to the first rotation angle, to capture the image of the plurality of markers. In this way, the controller can directly control the second imaging module to return to the preset position that does not affect the rotation of the first imaging module without performing calculations and judgments.

In addition, in some preferred embodiments, the controller can determine fine position information of the plurality of markers, according to the position of the plurality of markers in the image in the image coordinate system, and the first rotation angle of the first imaging module, and determine the position and/or the posture of the workpiece to be bonded, according to the fine position information of the plurality of markers. Herein, the accuracy of the fine position information is determined by the positioning accuracy level of the imaging module, which is below 0.01mm.

In the embodiments shown in Fig. 5 and Fig. 6, the above-mentioned workpiece to be bonded is a chip, with two of the markers set on two feature positions on edges thereof. The above-mentioned visual system comprises two imaging modules. Herein, in the process of rotating the plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers, the controller can separately obtain coarse position information of each of the markers (e.g. approximate position with millimeter level accuracy), and position and posture information of each of the imaging modules.

Afterwards, the controller can determine a first rotation angle of a first imaging module, and rotate the first imaging module through the view field adjustment mechanism to capture a first image of a first marker, according to first coarse position information of the first marker and first position and posture information of the first imaging module.

Afterwards, the controller can determine a second rotation angle of a second imaging module, and rotate the second imaging module through the view field adjustment mechanism to capture a second image of a second marker, according to second coarse position information of the second marker and second position and posture information of the second imaging module.

In addition, in some preferred embodiments, the controller can also determine first fine position information of the first marker, according to a first position of the first marker in the first image, and a first rotation angle of the first imaging module. Afterwards, the controller can determine second fine position information of the second marker, according to a second position of the second marker in the second image, and a second rotation angle of the second imaging module. Afterwards, the

controller can determine the position and/or the orientation of the workpiece to be bonded according to the first fine position information and the second fine position information.

In this way, the above-mentioned visual system of a bonding device provided in the first aspect of the present invention can capture the position and/or posture of large size workpieces to be bonded by using the view field of the plurality of the imaging modules, to reduce the requirement of the large chips for the size of the view field of a single imaging module, thereby lowering the cost of aligning the large chips.

In summary, the above-mentioned visual system of a bonding device, the above-mentioned method for determining position and posture of a workpiece to be bonded, and the above-mentioned computer-readable storage medium provided in the present invention can be used to collect an image of a plurality of markers on a workpiece to be bonded, to improve the bonding efficiency of wafer bonding process by adjusting angles of a view field of a plurality of imaging modules.

Although the method is illustrated and described as a series of actions for the purpose of simplifying the explanation, it should be understood and appreciated that these methods are not limited by the order of the actions. Those skilled in the art may understand that some actions may occur in different orders and/or concurrently with other actions that are illustrated and described herein or that are not illustrated and described herein, in accordance with one or more embodiments.

Those skilled in the art will understand that information, signals and data can be represented using any of a variety of different technologies and techniques. For example, the data, instructions, commands, information, signals, bits, symbols and chips cited throughout the above description may be represented by voltage, current, electromagnetic waves, magnetic fields or magnetic particles, optical fields or optical particles, or any combination thereof.

Although the controller described in the above embodiments can be implemented through a combination of software and hardware. However, it can be understood that the controller can also be implemented in software or hardware. For hardware implementation, the controller can be implemented on one or more application specific integrated circuits (ASICs), digital signal processors (DSPs),

programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, microcontrollers, microprocessors, other electronic devices used to perform the above functions, or selected combinations of the above devices. For software implementation, the controller can be implemented through independent
5 software modules such as procedures and functions running on a general-purpose chip, where each module performs one or more of the functions and operations described herein.

The steps of a method or algorithm described in connection with the embodiments disclosed herein may be embodied directly in hardware, in a software
10 module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor so that the processor can read information from, and write
15 information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a user terminal. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal.

In one or more exemplary embodiments, the functions described may be
20 implemented in hardware, software, firmware, or any combination thereof. If implemented in software as a computer program product, the functions may be stored on or transmitted over as one or more instructions or code on a computer-readable medium. Computer-readable media includes both computer storage media and communication media including any medium that facilitates transfer of a computer
25 program from one place to another. A storage media may be any available media that can be accessed by a computer. By way of example, and not limitation, such computer-readable media can comprise RAM, ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium that can be used to carry or store desired program code in the form of
30 instructions or data structures and that can be accessed by a computer. Also, any connection is properly termed a computer-readable medium. For example, if the

software is transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair, digital subscriber line (DSL), or wireless technologies such as infrared, radio, and microwave, then the coaxial cable, fiber optic cable, twisted pair, DSL, or wireless technologies such as infrared, radio, and microwave are included in the definition of medium. Disk and disc, as used herein, includes compact disc (CD), laser disc, optical disc, digital versatile disc (DVD), floppy disk and blu-ray disc where disks usually reproduce data magnetically, while discs reproduce data optically with lasers. Combinations of the above should also be included within the scope of computer-readable media.

The previous description of the disclosure is provided to enable any person skilled in the art to make or use the disclosure. Various modifications to the present disclosure will be obvious to those skilled in the art, and the general principles defined herein may be applied to other variations without departing from the spirit or scope of the disclosure. Thus, the present disclosure is not intended to be limited to the examples and designs described herein, but is to be accorded the broadest scope of the principles and novel features disclosed herein.

Claims

1. A visual system of a bonding device, comprising:

5 a plurality of imaging modules, used to capture an image of a plurality of markers on a workpiece to be bonded, so as to characterize a position and/or an orientation of the workpiece to be bonded; and

a view field adjustment mechanism, used to rotate at least one of the imaging modules, adjusting a view field position thereof, to cover the plurality of markers on the workpiece to be bonded.

10 2. The visual system according to claim 1, wherein the visual system further comprises a controller, which is configured for:

obtaining spacing information between the plurality of markers, to determine whether a view field of one of the imaging modules can simultaneously cover the plurality of markers;

15 in response to a judgment result that the view field of the one of the imaging modules can simultaneously cover the plurality of markers, rotating the one of the imaging modules through the view field adjustment mechanism to capture the image of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded; and

20 in response to a judgment result that the view field of the one of the imaging modules cannot simultaneously cover the plurality of markers, rotating the plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded.

25 3. The visual system according to claim 2, wherein the rotating the one of the imaging modules through the view field adjustment mechanism to capture image of the plurality of markers comprises:

obtaining coarse position information of the plurality of markers and first

position and posture information of a first imaging module, to determine a first rotation angle and a first rotation path range of the first imaging module;

obtaining current second position and posture information of a second imaging module, and combining it with the first rotation path range, to determine whether the second imaging module affects rotation of the first imaging module; and

in response to a judgment result that the second imaging module affects the rotation of the first imaging module, determining a second rotation angle of the second imaging module according to the current second position and posture information and the first rotation path range, and rotating the second imaging module through the view field adjustment mechanism to avoid affecting the rotation of the first imaging module.

4. The visual system according to claim 3, wherein the rotating the one of the imaging modules through the view field adjustment mechanism to capture images of the plurality of the markers further comprises:

in response to a judgment result that the second imaging module does not affect the rotation of the first imaging module, rotating the first imaging module through the view field adjustment mechanism according to the first rotation angle, to capture the image of the plurality of markers.

5. The visual system according to claim 4, wherein the controller is further configured for:

determining fine position information of the plurality of markers, according to the position of the plurality of markers in the image, and the first rotation angle of the first imaging module; and

determining the position and/or the orientation of the workpiece to be bonded, according to the fine position information of the plurality of markers.

6. The visual system according to claim 2, wherein the workpiece to be bonded is a chip, with two of the markers set on two feature positions on edges thereof, the visual system comprises two imaging modules, and the rotating the plurality of

imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers comprises:

separately obtaining coarse position information of each of the markers, and position and posture information of each of the imaging modules;

5 determining a first rotation angle of a first imaging module, and rotating the first imaging module through the view field adjustment mechanism to capture a first image of a first marker, according to first coarse position information of the first marker and first position and posture information of the first imaging module; and

10 determining a second rotation angle of a second imaging module, and rotating the second imaging module through the view field adjustment mechanism to capture a second image of a second marker, according to second coarse position information of the second marker and second position and posture information of the second imaging module.

15 7. The visual system according to claim 6, wherein the controller is further configured for:

determining first fine position information of the first marker, according to a first position of the first marker in the first image, and a first rotation angle of the first imaging module;

20 determining second fine position information of the second marker, according to a second position of the second marker in the second image, and a second rotation angle of the second imaging module; and

25 determining the position and/or the orientation of the workpiece to be bonded according to the first fine position information and the second fine position information.

8. The visual system according to claim 1, wherein the view field adjustment mechanism comprises:

a drive module, used to provide a rotational driving force;

30 a transmission module, used to transmit the rotational driving force to a corresponding imaging module, to make it perform rotational motion;

a limit module, used to restrict a rotation range of the imaging module, to prevent it from colliding with another component; and

a stop module, used to lock a rotation shaft of the imaging module after it rotate to a target angle.

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9. The visual system according to claim 1, wherein the imaging module comprises:

a prism, located at one end of the imaging module near the workpiece to be bonded, and used to rotate a view field of the imaging module;

10 a cylindrical mirror, located between the prism and a camera, and used to project a image of the workpiece to be bonded onto an imaging surface of the camera; and

the camera, located at one end of the imaging module away from the workpiece to be bonded, and used to capture the image of the plurality of markers on the workpiece to be bonded, through the cylindrical mirror and the prism.

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10. The visual system according to claim 1, wherein the workpiece to be bonded is a chip, the length range of its long side is between 0.1mm and 50mm, wherein

a view field of the imaging module is circular, with a diameter ranging from 1mm to 10mm, or

20 a view field of the imaging module is rectangular, with a long side length ranging from 1mm to 10 mm.

11. A method for determining position and posture of a workpiece to be bonded, comprising following steps:

25 obtaining spacing information between a plurality of markers on a workpiece to be bonded, to determine whether a view field of one imaging module of the visual system according to claim 1 can simultaneously cover the plurality of markers;

in response to a judgment result that the view field of the imaging module can simultaneously cover the plurality of markers, rotating the imaging module through
30 a view field adjustment mechanism to capture an image of the plurality of markers, to characterize a position and/or an orientation of the workpiece to be bonded; and

in response to a judgment result that the view field of the imaging module cannot simultaneously cover the plurality of markers, rotating a plurality of imaging modules through the view field adjustment mechanism to cooperatively capture a plurality of images of the plurality of markers, to characterize the position and/or the orientation of the workpiece to be bonded.

12. A computer-readable storage medium, having a computer instruction stored thereon, wherein when the computer instruction is executed by a processor, the method for determining position and posture of a workpiece to be bonded according to claim 11 is implemented.